CLAIMS:

1. An electrical converter (1) comprising:

- at least one converter input (IN1,IN2) for receiving electrical power;
- at least one converter output (OUT1,OUT2) for releasing electrical power;
- an electrical energy storage device (2) having a storage input connected to at least one of the converter inputs (IN1,IN2) and having a storage output connected to at least one of the converter outputs (OUT1,OUT2), for storing electrical energy from the received electrical power during a primary stroke period (t_{prim}) and for releasing electrical energy to the converter output (OUT1,OUT2) during a secondary stroke period (t_{sec}),

said electrical converter (1) further comprising a control device (4) comprising:

- a current sensor (5) for sensing the amount of current flowing to the electrical energy storage device (2);
- a first time control device (44) communicatively connected to the current sensing device for controlling the duration of at least one of said stroke periods such that the current flowing to the electrical energy storage device (2) during said stroke periods is substantially equal to or lower than a predetermined maximum current (I_{max}); and
- a second time control device (40) for controlling the duration of an off-time period (t_{off}) in which the electrical energy storage device (2) releases substantially no electrical energy, such that a time average of the current flowing to the electrical energy storage device (2) is equal to a predetermined value, which time average is the average over a switching period comprising the primary stroke period (t_{prim}), the secondary stroke period (t_{sec}), and the off-time period (t_{off}).

2. An electrical converter (1) as claimed in claim 1, wherein the first time control device (44) comprises means for ending the primary stroke period (t_{prim}) when the current flowing to the electrical energy storage device (2) is equal to the predetermined maximum current (I_{max}).

3. An electrical converter (1) as claimed in claim 1 or 2, wherein the second time control device (40) comprises means for ending the off-time period (t_{off}) when the average current flowing to the electrical energy storage device (2) during a switching period equals the predetermined value.

4. An electrical converter (1) as claimed in claim 3, wherein said second time control device (40) comprises:

a first on-off period control device (41) for determining an on-time period (t_{on}) corresponding to a desired time of the primary and secondary stroke (t_{prim},t_{sec}) of the electrical energy storage device (2) and an off-period corresponding to a desired off-time period (t_{off}) of the electrical energy storage device (2), which first on-off period control device (41) has an output for outputting an off-time end signal, which output is communicatively connected to a control of the electrical energy storage device (2).

5. An electrical converter (1) as claimed in claim 4, wherein the first on-off period control device (41) comprises:

a first capacitor (413) connected to a first current source (412) in an interruptable loop (412-414), which interruptable loop (412-414) is further connected to a second current source (411) and,

an interrupter (414) for interrupting said interruptable loop when the sensed current is equal to the predetermined maximum current (I_{max}) and for closing the interruptable loop when the current sensed by the current sensing device is substantially zero.

6. An electrical converter (1) as claimed in claim 4 or 5, wherein the second time control device (40) further comprises:

a second on-off period control device (42) communicatively connected to the output of the first on-off period control device (41) for determining a second off-period corresponding to a desired combined time of the secondary stroke period (t_{sec}) and the off-time period (t_{off}), which second on-off period control device (42) is arranged for generating a start signal (strt t_{prim}) for starting the primary stroke period (t_{prim}) at an end of the second off-period.

7. An electrical converter as claimed in claim 6, wherein the second on-off period control device (42) comprises:

a voltage to current converter (421) having a current output for outputting at the current output a current corresponding to the voltage (V_{413}) across the first capacitor (413), which voltage to current converter (421) is connected to the first capacitor (413) and,

a second capacitor (422) connected with a contact to the current output, which contact is also connected to a comparator device (43) for comparing a capacitor voltage (V_{422}) across the second capacitor (422) with a trigger voltage (V_{tr}) and outputting the start signal if the trigger voltage (V_{tr}) is below the capacitor voltage, and

a discharging device (423) for discharging the second capacitor in response to the start signal.

8. An electrical converter (1) as claimed in any one of the preceding claims, further comprising at least one switch (3) which, when in a conducting state, establishes an electrical contact between the storage input and the at least one converter input (IN1,IN2) so as to store electrical energy in the electrical energy storage device (2) and when in a non-conducting state, interrupts the electrical contact of the electrical energy storage device (2) with the converter input (IN1,IN2) so as to release electrical energy from the electrical energy storage device (2) to the converter output (OUT1,OUT2), which switch (3) is controlled by said control device (4).

9. An electrical converter (1) as claimed in any one of the preceding claims, wherein the current sensing device (5), the switch (3), and the electrical energy storage device (2) are connected in series between a first converter input (IN1) and a first converter output (OUT1), and a node (32) between the switch (3) and the electrical energy storage device (2) is connected to a second converter input (IN2) with a unidirectional conducting device (6).

10. An electrical converter (1) as claimed in any one of the preceding claims, wherein the predetermined maximum current (I_{max}) is lower than or equal to the saturation current of the electrical energy storage device (2).

11. An electrical appliance (SVR) comprising: a rechargeable battery (B), an electric motor (M), a switch (SW) for connecting the motor (M) to the battery (B), and an electrical converter device as claimed in any of the preceding claims for charging the battery (B) and/or powering the motor (M).